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MULTIVISION SYSTEM, COLOR CALIBRATION METHOD AND DISPLAY

This application is the national phase under 35 U.S.C. §371 of PCT International Application No. PCT/JP98/01709 which has an International filing date of Apr. 15, 1998 which designated the United States of America.

TECHNICAL FIELD

The present invention relates to color calibration of a display device and a multi-vision system comprising a plurality of display units.

BACKGROUND ARTS

FIGS. 16 and 17 from Japanese unexamined patent publication Hei7-72817 illustrate a part of the cross-sectional diagram and the block chart of an important part for the conventional multi-vision brightness control apparatus comprising the plurality of display units.

Also, FIG. 18 is the flow chart showing an operation of the same multi-vision brightness control apparatus.

Description to the numbered components indicated in FIGS. 16 and 17 follows: a screen R1; a sensor R3 for detecting the brightness of an outer rim; a wall R5; a ceiling R6; a storage shelf R7; a skylight R31; a projection unit R8; a lens block R9 of the projection unit R8; a control board R10 of the projection unit R8; a Braun tube R11 of the projection unit R8; a console panel R12 of the projection unit R8; and a lead wire R13 for transmitting signal of the sensor R3 to the control board.

There are a plurality of screens R1 and projection units R8. There is one projection unit R8 for every one of the screens R1. An image from the projection unit R8 is projected to the screen R1. The sensor R3 is arranged at the outer rim of a screen frame, and the sensor R3 detects a beam brightness being illuminated to the screen frame. Brightness information detected by the sensor R3 is transmitted to the control board R10 via the lead wire R13, and the brightness information is stored and used for calculation for setting the brightness to the Braun tube R11.

Following is a detailed description for the operation of the multi-vision brightness control apparatus comprising the above-mentioned configuration with reference to FIG. 18.

First of all, the multi-vision brightness control apparatus is powered on (step 101). Next, a content of a memory device inside a control circuit is cleared to 0 (step 102), and when a certain time has lapsed (step 103), a time counter t is cleared to 0 (step 104). The sensor R3 detects a surrounding brightness (step 105), and the brightness information of the surrounding is input to the control board R10 via the lead wire 13. The control board R10 calculates a minimum brightness values of the Braun tube R11 (step 106) so that it is easy to see responding to the surrounding brightness. A result of the calculation is inputted to the Braun tube, then brightness is set (step 107), and an image is projected to the screen. If the apparatus is turned off (step 108), a termination process is performed (step 109), and if the apparatus is not turned off (step 108), the process is repeated from the step of detecting the brightness. surrounding is input to the control board R10 via the lead wire R13. The control board R10 calculates a minimum brightness values of the Braun tube R11 so that it is easy to see responding to the surrounding brightness. A result of the calculation is inputted to the Braun tube, then brightness is set, and an image is projected to the screen. If the apparatus is turned off, a termination

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process is performed, and if the apparatus is not turned off, the process is repeated from the step of detecting the brightness.

The multi-vision from the conventional example has performed the brightness control as described above. Since only information obtained from the sensor R3 is the brightness information, such that a brightness setting responding to a surrounding environment only at that instance is optimally set, and a control of the display color was not possible.

Also, the sensor R3 of the conventional multi-vision is not set for each one of the screens, therefore, even if there is a difference in the display colors between the screens, the conventional multi-vision is unable to detect the difference such that the color for every screen cannot be controlled, so the color is unevenly displayed as it is.

The present invention aims to adjust the display color of the display unit to a target color.

Also, the present invention aims to get rid of the differences in the display colors between the display units by adjusting the display colors of the plurality of display units of the multi-vision system to the same target color.

Further, the present invention aims to improve the performance of the whole color adjustment by optimally selecting a target color which is a measure to the display color adjustment for a plurality of the display units of the multi-vision system.

Furthermore, the present invention aims to perform the above-mentioned color calibration automatically eliminating too much manual operations with a simply configured unit.

DISCLOSURE OF THE INVENTION

According to one aspect of the present invention, a multi-vision system including a plurality of display units comprises the following: a sensor for performing colorimetry of display colors from the plurality of display units; a color conversion coefficient calculation unit for calculating a color conversion coefficient to calibrate a display color of each display unit by using colorimetry values obtained from the sensor by performing the colorimetry for the display colors of the plurality of display units; and a color processing unit for performing a color conversion of the display color of each display unit by using a calculated color conversion coefficient from the color conversion coefficient calculation unit.

According to another aspect of the present invention, the multi-vision system includes the following: the color processing unit which receives a signal of at least one of representing colors, and displays the representing color on the display units without a color conversion; the sensor perform colorimetry for the representing color of the plurality of display units displayed by the color processing unit; and the color conversion coefficient calculation unit calculates the color conversion coefficient of each display unit for color converting the representing color measured by the sensor to a pre-determined target color, and outputs a calculated color conversion coefficient to the color processing unit.

According to another aspect of the present invention, the multi-vision system includes the sensor which is positioned inside the multi-vision system and in between non-display area of the plurality of display units.

According to another aspect of the present invention, the multi-vision system includes the sensor which is positioned outside of the multi-vision system.